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(54) **Blade clamp mechanism**

(57) The present invention relates to a keyless blade clamp mechanism including a base (4), a sliding block (6) slidably disposed on the base (4) and a clamping lever (11) pivotally connected on the base (4). On one pivot side of the clamping lever (11) is a clamp plate (7) and on the other pivot side of the clamping lever (11) is a plate (3). The base (4) has a supporting surface (12)

opposing the clamp plate (7). In use, the sliding block (6) slides to engage and press the plate (3) causing the clamp plate (7) to pivot and a gap to appear between the clamp plate (7) and the supporting surface (12) to permit a saw blade (9) to be inserted into (or be pulled out of) the gap. The present invention has the advantage that few components are involved and it is easily manufactured at low cost.

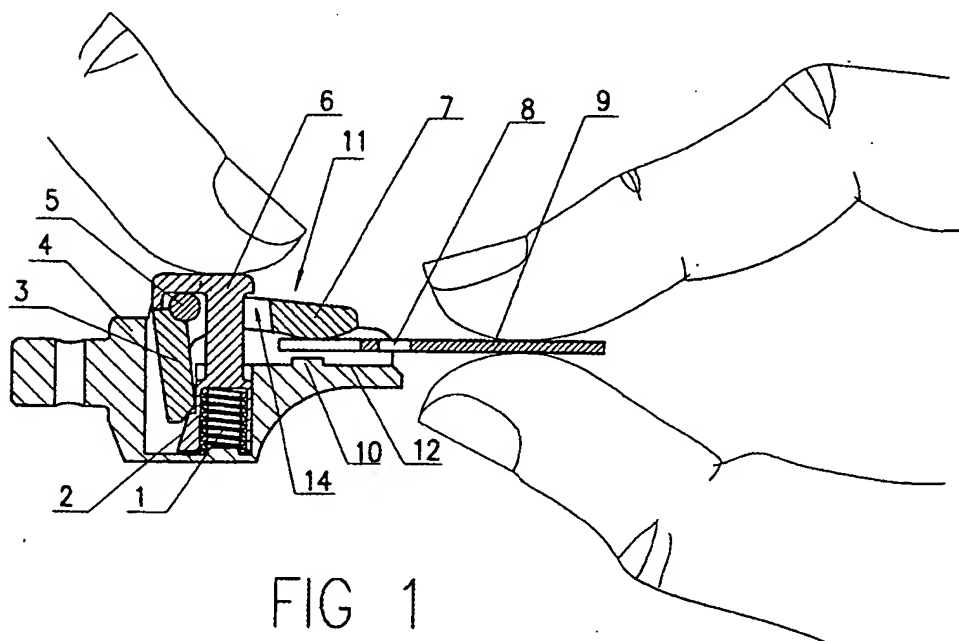


FIG 1

Description

[0001] The present invention relates to a blade clamp mechanism (eg a keyless blade clamp mechanism) and to a cutting assembly (such as a saw) comprising the blade clamp mechanism.

[0002] US-A-6209208 discloses a clamping mechanism which comprises a driving subassembly with an outer cam surface and an inner cam surface and a locking subassembly. The locking subassembly includes an outer follower surface adapted to be driven by the outer cam surface and an inner follower surface adapted to be driven by the inner cam surface whereby the locking subassembly is moved in the radial direction and locks the blade when the driving subassembly rotates. The inner cam surface presses directly on the outer cam surface to actuate the movement in the radial direction therefore the clamping mechanism is laborious to operate. Furthermore, the components included in the clamping mechanism are subject to relatively large manufacturing errors and the integral cam is difficult to manufacture.

[0003] The present invention seeks to provide a keyless blade clamp mechanism with a simple structure.

[0004] Thus viewed from one aspect the present invention provides a keyless blade clamp mechanism for clamping a blade comprising:

- a base with a supporting surface for supporting the blade;
- a sliding block slidably mounted on the base;
- an elastic member mounted between the sliding block and the base for giving the sliding block an upward tendency; and
- a clamping lever pivotally mounted on a horizontal pivot on the base which includes on a first side of the pivot and opposed to the supporting surface a clamp plate capable of bearing against the upper side of the blade and on a second side of the pivot a downwardly dependent plate.

[0005] The keyless blade clamp mechanism of the present invention includes a base, a sliding block slidably disposed on the base and a clamping lever pivotally connected to the base. On one pivot side of the clamping lever is a clamp plate and on the other pivot side of the clamping lever is a plate. The base has a supporting surface opposing the clamp plate. In use, the sliding block slides to engage and press the plate causing the clamp plate to tilt and a gap to appear between the clamp plate and the supporting surface to permit a saw blade to be inserted into (or be pulled out of) the gap. The present invention has the advantage that few components are involved and it is easily manufactured at low cost.

[0006] Preferably the keyless blade clamp mechanism further comprises:

- a locking bevel at a lower end of the sliding block

and

a plunger at an upper end of the sliding block where-in:

when the clamp plate clamps the blade, the locking bevel is engaged with an end of the plate remote from the pivot and the plunger is disengaged from an end of the plate at or near to the pivot and when the clamp plate is unclamped, the plunger engages and presses the end of the plate at or near to the pivot.

[0007] In a preferred embodiment, the end of the plate remote from the pivot is beveled and when the clamp plate clamps the saw blade, the locking bevel is engaged with the beveled end of the plate remote from the pivot.

[0008] In a preferred embodiment, a spring is mounted between the sliding block and the base and pivotally biases the sliding block upwardly giving the clamp plate a tendency to clamp the blade.

[0009] In a preferred embodiment, a spring is mounted between the sliding block and the base and biases the sliding block upwardly giving the plunger a tendency to disengage the plate.

[0010] In a preferred embodiment, the sliding block extends through a through hole on the clamp plate.

[0011] In a preferred embodiment, the plate is downwardly dependent at approximately 90° to the clamp plate.

[0012] Preferably the keyless blade clamp mechanism further comprises:

- a positioning protrusion on the supporting surface or the clamp plate cooperable with a positioning hole in the blade.

[0013] Viewed from a further aspect the present invention provides a blade clamp mechanism comprising:

- a hollow base with opposing sides defining an upper supporting edge for supporting the blade;
- a pivot mounted prominently on the supporting edge;
- a clamping lever pivotally mounted on the pivot which includes on a first side of the pivot a clamp plate capable of bearing against the upper side of the blade supported on the supporting edge and on a second side of the pivot a plate downwardly dependent into the hollow base; and
- an actuating member passing through the clamp plate for actuating the clamp plate between a clamping position in which the clamp plate is clamped against the blade supported on the supporting edge and a non-clamping position in which the clamp plate is not clamped against the blade supported on the supporting edge,
- an elastic member mounted between the actuating

member and the base for giving the actuating member an upward tendency,

wherein the actuating member is compressively mounted on the hollow base such that a lower portion of the actuating member is urged into engagement with a lower portion of the plate to pivotally bias the clamp plate into the clamping position.

[0014] In accordance with the invention the blade clamp mechanism has a tendency towards the clamping position and is manually manipulable into the non-clamping position.

[0015] Preferably the actuating member is compressively mounted by a compression spring between the actuating member and the hollow base to bias the blade clamp mechanism towards the clamping position.

[0016] Preferably the actuating member is slidably mounted on the hollow base.

[0017] Preferably the lower portion of the actuating member has a beveled face (eg a face of the rear wall).

[0018] Preferably the lower portion of the plate has a beveled face (eg a face of the front wall).

[0019] In a preferred embodiment, the actuating member comprises:

an exteriorly manipulable plunger extending upwardly and rearwardly from a hollow lower body, wherein the hollow body is compressively mounted on the hollow base such that in the clamping position the plunger is linearly biased into disengagement from the upper end of the plate. The plunger typically comprises an inverted, substantially U-shaped body. A compression spring may be connected internally to the hollow lower body. A face of the rear wall of the hollow lower body may be beveled. The side walls of the hollow lower body may be adapted (eg raised) to cooperate slidably with adjacent interior walls of the hollow base.

[0020] Preferably the plunger is linearly manipulable into engagement with the upper end of the plate to pivot the clamp plate from the clamping into the non-clamping position.

[0021] Preferably the lower portion of the plate has a beveled face and the lower portion of the actuating member has a beveled face whereby the beveled face of the actuating member is urged into engagement with the beveled face of the plate to pivotally bias the clamp plate into the clamping position.

[0022] The pivot may be mounted on prominences on the upper supporting edge of the opposing sides of the hollow base. The prominences may be substantially semi-circular prominences with coaxial apertures. The remainder of the upper supporting edge is largely flat.

[0023] The clamp plate typically comprises a plate body with twin parallel arms pivotally mounted in spaced apart relationship on the pivot. The space between the arms is sufficient to permit the actuating member to pass

through. The plate may be downwardly dependent into the hollow base from the twin arms.

[0024] Viewed from a yet further aspect the present invention provides a keyless blade clamp mechanism characterized in comprising a base, a sliding block slidably disposed on said base, a clamping lever pivotally connected with said base, one pivot side of said clamping lever being a clamp plate, the other pivot side of said clamping lever being an oppressed plate, said base having a supporting surface opposite to said clamp plate.

[0025] Viewed from a still yet further aspect the present invention provides a cutting assembly comprising a blade clamp mechanism as defined hereinbefore and a blade.

[0026] The present invention will now be described in a non-limitative sense with reference to the accompanying Figures in which:

Figure 1 shows a sectional view of an embodiment of the present invention (saw blade being inserted); Figure 2 shows a sectional view of the embodiment of the present invention (saw blade has been inserted);

Figure 3 shows a sectional view of the embodiment of the present invention in the clamping position; Figure 4 shows an exploded perspective view of the embodiment of the present invention; and Figure 5 shows a perspective view of the assembled embodiment of the present invention.

[0027] Figures 1, 2 and 3 show a sectional view of an embodiment of the blade clamp mechanism of the present invention during and after insertion of a saw blade 9 in clamping and non-clamping positions. The blade clamp mechanism includes a hollow base 4 with an upper supporting surface (edge) 12 for supporting the underside of the saw blade 9. A clamping lever 11 is pivotally mounted on a horizontal pivot 5 of the base 4 and includes on a first side of the pivot 5 a clamp plate 7 capable of bearing against the upperside of the saw blade 9 and on a second side of the pivot 5 a plate 3 downwardly dependent into the hollow base 4 at approximately 90° to the clamp plate 7. An inward face of the free end of plate 3 (ie the end remote from the pivot 5) is beveled.

[0028] A sliding block 6 slidably mounted on the base 4 has (at its lower end) a locking bevel 2 and at its upper end an inverted U-shaped plunger 13 capable of engaging the upper end of plate 3. The sliding block 6 extends through a through hole 14 on the clamp plate 7. By means of a spring 1 mounted inside a cavity in the sliding block 6 and on a protrusion (not shown) on the base 4, the sliding block 6 is biased upwardly (ie the blade clamp mechanism is biased towards the clamping position as described hereinafter).

[0029] In the clamping position (Figure 3) of the blade clamp mechanism, the clamp plate 7 is clamped (see Figure 3) against the saw blade 9 on the supporting sur-

face 12. In this position, the locking bevel 2 engages the beveled face of the free end of plate 3 and the plunger 13 is disengaged from the upper end of plate 3. By virtue of the engagement of the locking bevel 2 and the beveled face of the free end of plate 3, the spring 1 gives the plate 3 a tendency to rotate (in the clockwise direction of Figure 3) and (by virtue of its linear restoring force) gives the plunger 13 a tendency to remain disengaged from the upper end of plate 3.

[0030] To insert the blade clamp 9, the sliding block 6 is manually depressed against the restoring force of the spring 1. This causes the locking bevel 2 to move downwardly to allow the plunger 13 to engage and press the upper end of plate 3 causing the plate 3 to rotate (in the anti-clockwise direction of Figures 1 and 2) on pivot 5. This increases the gap between the clamp plate 7 and the supporting surface 12 so that the saw blade 9 may be easily inserted. A positioning protrusion 10 on the supporting surface 12 protrudes towards the clamp plate 7. After the saw blade 9 is inserted between the supporting surface 12 and the clamp plate 7, the positioning protrusion 10 is seated in a positioning hole 8 in the saw blade 9 (see Figure 2).

[0031] To withdraw the blade clamp 9, the sliding block 6 is manually depressed against the restoring force of the spring 1. This causes the locking bevel 2 to move downwardly to allow the plunger 13 to engage and press the upper end of plate 3 causing the plate 3 to rotate (in the anti-clockwise direction of Figures 1 and 2) on pivot 5. This increases the gap between the clamp plate 7 and the blade clamp 9 so that the saw blade 9 may be withdrawn.

Claims

1. A keyless blade clamp mechanism for clamping a blade [9] comprising:

a base [4] with a supporting surface [12] for supporting the blade [9];

a sliding block [6] slidably mounted on the base [4];

an elastic member [1] mounted between the sliding block [6] and the base [4] for giving the sliding block [6] an upward tendency;

a clamping lever [11] pivotally mounted on a horizontal pivot [5] on the base [4] which includes on a first side of the pivot [5] and opposed to the supporting surface [12] a clamp plate [7] capable of bearing against the upper-side of the blade [9] and on a second side of the pivot [5] a downwardly dependent plate [3].

2. A keyless blade clamp mechanism as claimed in claim 1 further comprising:

a locking bevel [2] at a lower end of the sliding

block [6] and
a plunger [13] at an upper end of the sliding block [6]

wherein:

when the clamp plate [7] clamps the blade [9], the locking bevel [2] is engaged with an end of the plate [3] remote from the pivot [5] and the plunger [13] is disengaged from an end of the plate [3] at or near to the pivot [5] and
when the clamp plate [7] is unclamped, the plunger [13] engages and presses the end of the plate [3] at or near to the pivot [5].

3. A keyless blade clamp mechanism as claimed in claim 1 or 2, wherein the end of the plate [3] remote from the pivot [5] is beveled and when the clamp plate [7] clamps the saw blade [9], the locking bevel [2] is engaged with the beveled end of the plate [3] remote from the pivot [5].

4. A keyless blade clamp mechanism as claimed in any preceding claim wherein said elastic member is a compressed spring [1].

5. A keyless blade clamp mechanism as claimed in claim 1, wherein a compressed spring [1] is mounted between the sliding block [6] and the base [4] and biases the sliding block [6] upwardly giving the plunger [13] a tendency to disengage the plate [3].

6. A keyless blade clamp mechanism as claimed in any preceding claim, wherein the sliding block [6] extends through a through hole [14] on the clamp plate [7].

7. A keyless blade clamp mechanism as claimed in any preceding claim, wherein the plate [3] is downwardly dependent at approximately 90° to the clamp plate [7].

8. A keyless blade clamp mechanism as claimed in any preceding claim further comprising:

a positioning protrusion [10] on the supporting surface [12] or on the clamp plate [7] to cooperate with a positioning hole [8] provided in the blade [9].

9. A blade clamp mechanism for clamping a blade [9] comprising:

a hollow base [4] with opposing sides defining an upper supporting edge [12] for supporting the blade [9];

a pivot [5] mounted prominently on the supporting edge [12];

a clamping lever [11] pivotally mounted on the pivot [5] which includes on a first side of the pivot [5] a clamp plate [7] capable of bearing against the upperside of the blade [9] supported on the supporting edge [12] and on a second side of the pivot [5] a plate [3] downwardly dependent into the hollow base [4]; and an actuating member [6] passing through the clamp plate [7] for actuating the clamp plate [7] between a clamping position in which the clamp plate [7] is clamped against the blade [9] supported on the supporting edge [12] and a non-clamping position in which the clamp plate [7] is not clamped against the blade [9] supported on the supporting edge [12], an elastic member [1] mounted between the actuating member [6] and the base [4] for giving the actuating member [6] an upward tendency,

wherein the actuating member [6] is compressively mounted on the hollow base [4] such that a lower portion [2] of the actuating member [6] is urged into engagement with a lower portion of the plate [3] to pivotally bias the clamp plate [7] into the clamping position.

10. A blade clamp mechanism as claimed in claim 9 wherein the elastic member is a compression spring and the actuating member [6] is compressively mounted by the compression spring [1] between the actuating member [6] and the hollow base [4] to bias the blade clamp mechanism towards the clamping position.

11. A blade clamp mechanism as claimed in claim 9 or 10 wherein the actuating member [6] is slidably mounted on the hollow base [4].

12. A blade clamp mechanism as claimed in claim 9, 10 or 11 wherein the lower portion [2] of the actuating member [6] has a beveled face.

13. A blade clamp mechanism as claimed in any of claims 9 to 12 wherein the lower portion of the plate [3] has a beveled face.

14. A blade clamp mechanism as claimed in any of claims 9 to 13 wherein the actuating member [6] comprises:

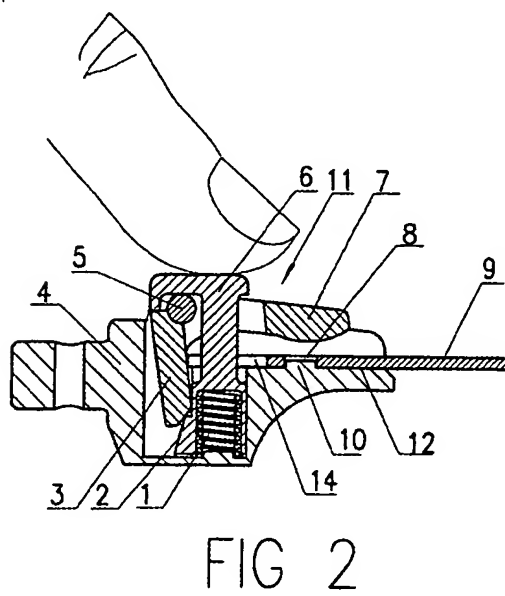
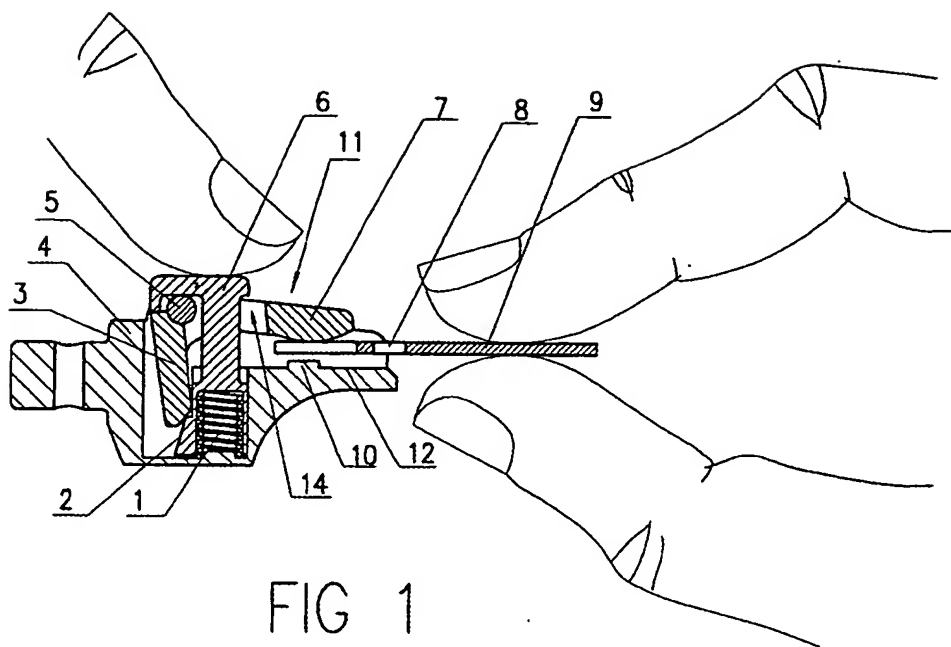
an exteriorly manipulable plunger [13] extending upwardly and rearwardly from a hollow lower body, wherein the hollow lower body is compressively mounted on the hollow base [4] such that in the clamping position the plunger [13] is linearly biased into disengagement from the upper end of the plate [3].

15. A blade clamp mechanism as claimed in claim 14 wherein the exteriorly manipulable plunger [13] is linearly manipulable into engagement with the upper end of the plate [3] to pivot the clamp plate [7] into the non-clamping position.

16. A blade clamp mechanism as claimed in claim 14 wherein a compression spring [1] is connected internally to the hollow lower body.

17. A blade clamp mechanism as claimed in claim 9 wherein the lower portion of the plate [3] has a beveled face and the lower portion [2] of the actuating member [6] has a beveled face whereby the beveled face [2] of the actuating member [6] is urged into engagement with the beveled face of the plate [3] to pivotally bias clamp plate [7] into the clamping position.

18. A cutting assembly comprising a keyless blade clamp mechanism as defined in any preceding claim and a blade.



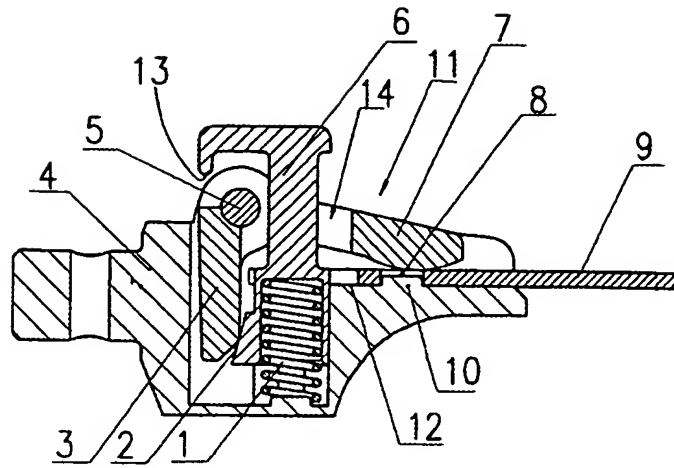


FIG 3

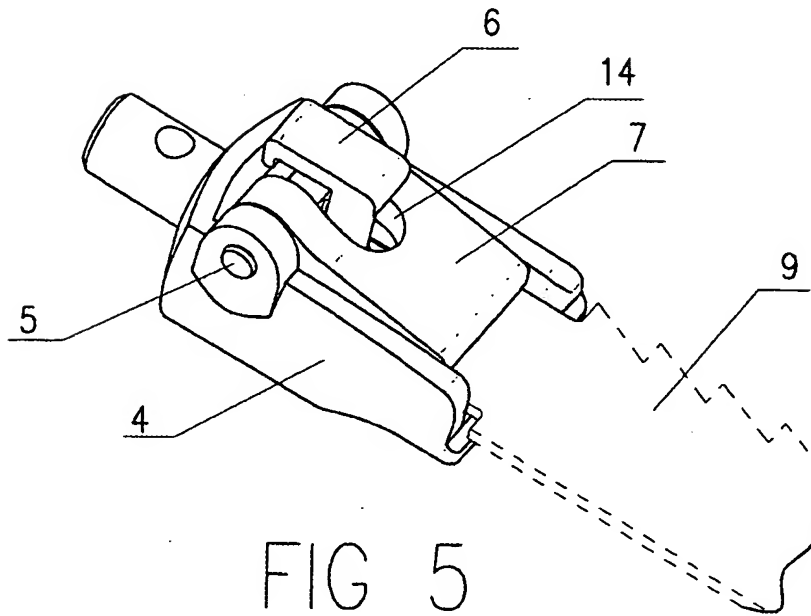


FIG 5

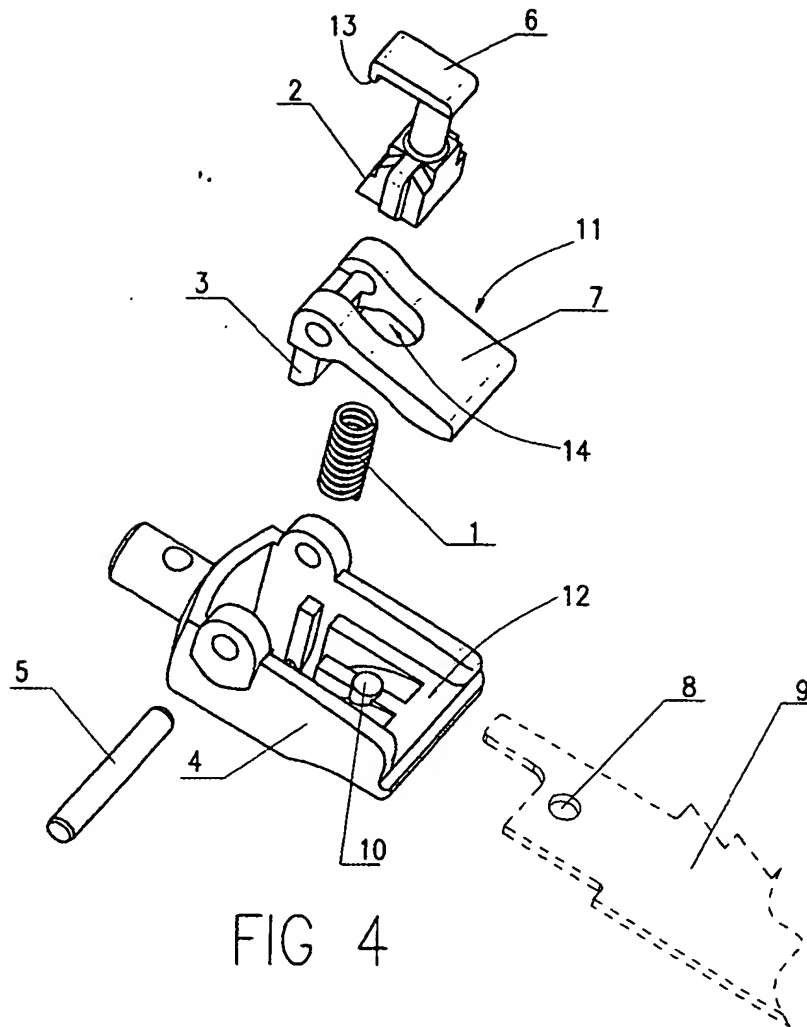


FIG 4



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 04 25 0021

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
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Place of search THE HAGUE		Date of completion of the search 20 April 2004	Examiner Rijks, M
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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ANNEX TO THE EUROPEAN SEARCH REPORT

ON EUROPEAN PATENT APPLICATION NO:

EP-04-25 0021

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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